64TH CONFERENCE ON EXCEPTIONAL CHILDREN

WORKING TOGETHER TO ACHIEVE STUDENT SUCCESS

What Are They Hearing? The Educational Impact of Hearing Loss

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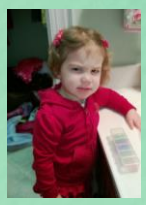
Which Child Has Hearing Loss?

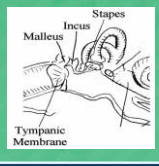

Facts about Hearing Loss

- Hearing difficulties are often “invisible”
- About 5 per 1000 children between age of 3 and 17 have hearing loss
- 3 out of 4 children have an ear infection by the age of 3
- 2013-2014 Head Count, 2069 childtren ages 3-21 being served primary HI in North Carolina (DPI data)
- About 85% of all Deaf and H/H students are educated in public school systems
- 43% of Deaf and H/H kids spend most of the day in a mainstream classroom (2008 data, probably more now)

Parts of the Ear

Outer Ear "Catches" the sound: Conductive Loss

Middle Ear "Turns Up" the Sound: Conductive Loss

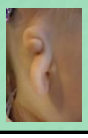


Inner Ear: Fine tunes and sends sounds to the brain
*Sensorineural Loss

Causes & Types of Hearing Loss

Conductive Loss

- Sound is blocked or can't reach the inner part of the ear
- Solution: Increase volume, sometimes fixable through medical intervention (tubes, surgery, medication)
- Can lead to delayed speech and language in kids
- Possible causes:
  - Deformed ear/ ear canal, problems with middle ear bones
  - Foreign objects in the ear canal or wax
  - Fluid/ ear infections, some syndromes (i.e. Down Syndrome)



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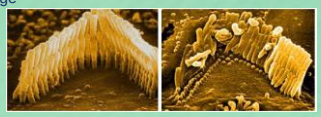
Sensorineural Loss

- Damage in the inner part of the ear to the hair cells that help to send sound to the brain; can lead to delayed speech and language
- Permanent & not typically responsive to medical intervention
- Solution: Need increased volume and clarity for distortion~ may not resolve better clarity depending on severity of distortion
- Deafness from birth or acquired later in life (i.e. meningitis)
- Syndromes, genetic disorders or mitochondrial disorders
- Noise damage
- Aging



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Mixed Hearing Loss

- Combination of both conductive and sensorineural; outer/middle and inner ear problems
- Sound can't get in correctly, and the sound is distorted.
- May need increased volume and help with clarity

Degrees of Hearing Loss

Normal hearing:
0 to 20 dB

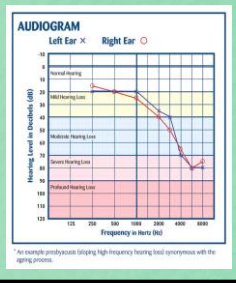
Mild Loss:
21 to 40 dB

Moderate Loss:
41 to 55 dB

Moderately-severe Loss:
56 to 70 dB

Severe Loss:
71 to 90 dB

Profound Loss:
91+ dB



Hearing Aids

- Hearing aids can be fit on infants. The earlier a hearing aid is fit, the better the chances of developing near normal or normal speech and language (provided there are no other cognitive or related factors)
- In North Carolina, all babies have a hearing screening at birth, so hearing aids can be fit within the first 6 months of life
- Consists of microphone (picks up sound), amplifier (turns it up), and receiver (converts electrical signal back to acoustic for ear to hear)
- Hearing aids are NOT a "cure" for hearing loss, they do not restore normal hearing to damaged ears.

Cochlear Implant

- Surgical option for children who are deaf in both ears and cannot benefit well enough from hearing aids.
- "Electrical" hearing, not "acoustic hearing"
- As of 2012, 38,000 children have an implant

How does a Cochlear Implant work?

- Microphone picks up the sound on the processor that's worn on the ear
- Speech processor selects and arranges sound that the microphone picks up
- Transmitter and receiver/stimulator takes sounds from speech processor and coverts to electrical impulses
- These electrical impulses are sent to electrodes inside the cochlea (inner ear), to be sorted and sent to the hearing nerve and from there to the brain to be processed.
- Simulation of how we hear with an implant: Simulation

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Possible Effects of Hearing Loss in the Classroom

Mild Loss

- Hard to hear faint or distant speech
- Child can miss from 10-40% of speech signal depending upon degree of mild loss and up to 50% of classroom discussions
- Percent of speech signal missed increases with background noise
- Younger kids may watch & copy actions of classmates rather than try to listen to teacher
- Maybe be unaware of subtle conversational cues
- May sound like ears are "plugged"
- Self-esteem may begin to suffer and may increase in fatigue

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Moderate Loss

- Speech, language and learning will be affected
- Up to 80% of speech signal can be missed with a 50dB hearing loss
- Significant trouble hearing in noise
- May have limited vocabulary and disordered syntax
- Socialization with peers will be more difficult, especially in noise
- FATIGUE due to effort needed to listen
- May rely more heavily on visual cues in the classroom
- This is the level where teachers will probably begin to notice the hearing loss effects
- Will need FM in the classroom

Hearing Loss Simulations

- Flinstones Video

http://viewpure.com/TD5E88fFnxE?ref=search

Moderately Severe to Severe Loss

- Without hearing aids speech must be very loud to be understood
- Without early intervention (before age 1), speech, intelligibility, syntax will be delayed
- With hearing aids ALONE, ability to understand is reduced in noise and distance
- Child will be aware of people talking around him/her but will miss parts of what said, making communication one-on-one or in groups very difficult
- Greater difficulty socializing, especially in noisy situations
- Tendency for poorer self-concept and/or social immaturity
- FM/ amplification crucial
- Remember: Even on their best "hearing" day, they will still have a mild to moderate hearing loss with amplification

Academic Achievement

- Difficulty in all areas of academics, mostly reading and mathematical concepts
- Kids with mild to moderate loss may be one to four grade levels behind normal hearing peers without appropriate management
- Kids with severe-to-profound loss usually top out at a 3rd or 4th grade level without appropriate and early educational intervention
- Gap in academic achievement between normal hearing and children and those with hearing loss may widen as they go through school
- Level of achievement is influenced by parental involvement and timing, quantity, quality and support the children receive

www.asha.org/public/hearing/disorders/effects.htm

What Does the Child Need at School to Improve Access to Sound?

- Better classroom acoustics~ reduce noise in the classroom Examples: carpet, window treatments, tennis balls on chair legs, acoustic tiles, anything to reduce and absorb sound
- Preferential seating~ Child sits closer to the teacher/speaker to have better view of the teacher's face and be closer in distance to the teacher
- Good lighting
- Support from school personnel to wear personal hearing aids during the school day and at home
- Appropriately fit, functioning hearing aids and/or cochlear implant
- FM system!

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What is an FM System?

- Hearing aid microphones are only designed to "pick up" sound up to around 6 feet
- In a classroom, teachers don't stand in one place!
- Teacher wears a microphone (boom mic, necklace type mic, or lapel mic), and the student wears a receiver on his/her hearing aid
- This acts like a personal radio for the child, and the teacher/speakers voice is brought directly to the child's ear or to a speaker in the classroom
- This overcomes the problem of noise and distance
- BUT, some kids still struggle depending upon the severity and type of hearing loss

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Types of FM systems

- Ear level/ personal: Used with hearing aids

Classroom Amplification System

- Tower Classroom Speaker and teacher microphone, work on FM or Infrared



FM Simulation

FM Simulation

Role of the Audiologist in the Schools

- Evaluate hearing and provide appropriate amplification for educational use (i.e. FM system) or refer for medical/outside intervention
- Be a part of the IEP team and recommend appropriate accommodations/modifications
- Give educationally relevant interpretation of hearing test findings
- Provide counseling to parents, students, and other school personnel
- Provide trainings about hearing loss and hearing to school personnel, students, and parents to help facilitate understanding of the impact of hearing loss on language, learning, reading and social development
- Collaboration with outside agencies to share information and implement student programs
- Give assistance regarding selection, purchase, installation, maintenance, calibration and utilization of audiologic equipment
- Provide supervision for mass hearing screening initiatives
- Make recommendations for improving acoustic accessibility in the classroom setting

Discussion and Questions

References

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- http://www.nidcd.nih.gov/health/hearing/pages/coch.aspx
- Current NC DPI data